

## REMARKS

Claims 1-25 are pending in the present Application. No claims have been canceled, Claim 1 has been amended, and no claims have been added, leaving Claims 1-25 for consideration upon entry of the present Amendment.

Claim 1 has been amended to add the limitation “about 8 to about 10 wt% molybdenum.” Claim 1 has been further amended to amend the term “wherein the composition is devoid of niobium” to “and wherein the composition is devoid of chromium.” Support for this amendment can at least be found in Claim 1 as originally filed as well as in Paragraphs [0033] and [0047] as originally filed.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims are respectfully requested in view of the above amendments and the following remarks.

### Claim Rejections Under 35 U.S.C. § 112, First Paragraph

Claims 1-25 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection.

The claim limitation “devoid of niobium” has been amended to read “devoid of chromium.” Accordingly, the Examiner’s rejection under § 112, first paragraph, is rendered moot. Reconsideration and withdrawal of this rejection are respectfully requested.

Applicants respectfully submit that the presently amended limitation “devoid of chromium” is amply supported throughout the specification. For example, the specification recites that “[i]n one embodiment, in the equations (1) and (2) above, all of the elements may be optional if desired.” (¶ [0047]) The specification therefore discloses embodiments that are devoid of chromium because it recites that the elements in equations (1) and (2), including chromium, may be optional. In addition, all of alloys disclosed in the Examples are devoid of chromium. (¶¶ [0053]-[0059]; Tables 1 and 2). Applicants therefore respectfully submit that the originally filed disclosure would have conveyed to one having ordinary skill in the art that

Applicants had possession of the concept of what is claimed. *See Ex parte Parks*, 20 USPQ2d 1234, 1236 (Bd. Pat. App. & Inter. 1993); MPEP § 2173.05(i).

Claim Rejections Over U.S. Patent No. 6,258,182 to Schetky et al.

Claims 1-3, 9-16, and 24 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 6,258,182 to Schetky et al. (“Schetky”). Claims 4-8, 17-23, and 25 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Schetky. Applicants respectfully traverse these rejections.

In making the § 102(b) rejection, the Examiner has stated that

Schetky teaches examples within the instant  $Mo_{eq}$  range in Table III, #28 ( $Mo_{eq}$  = 9.22), which contains 0% Nb, which meets the instant amended limitation of “devoid of niobium.”

(Office Action dated March 8, 2006 at page 2) In the previous Response, Applicants stated that

It is to be noted that when the composition of Schetky does not contain niobium, it does not meet the limitations of Claim 1 as presently amended, i.e., it does not meet the limitations of a molybdenum equivalent of 7 to 11 wt% as presently claimed.

(Response to Office Action dated June 15, 2005 at page 10) Upon further review of Schetky, Applicants realize that this statement was in error.

As presently amended, Claim 1 is directed to alloy compositions comprising titanium, about 8 to about 10 wt % molybdenum, and a molybdenum equivalent (hereinafter “ $Mo_{eq}$ ”) weight of about 7 to about 11 wt%, wherein the alloy composition is superelastic and/or pseudoelastic, and wherein the composition is devoid of chromium. Applicants respectfully submit that Schetky fails to disclose all elements of the present claims. As shown in the Table below, Schetky does not teach a titanium alloy composition comprising about 8 to about 10 wt% molybdenum, which does not also comprise chromium, and has a  $Mo_{eq}$  weight of about 7 to about 11 wt%, as required by the claims as presently amended.

<b>Alloy</b>	<b>Mo</b>	<b>Al</b>	<b>Cr</b>	<b>V</b>	<b>Nb</b>	<b>MoEq</b>
#27	9.5	3.1	1.4	1.4	3.1	<b>10.45</b>
#28	10	3.5	1.7			<b>9.22</b>
#29	9	2.3	1.4		3	<b>9.78</b>
#30	10.3	2.7	1.80	1.6		<b>11.55</b>
#31	11.8	3.7				<b>8.10</b>
#32	11	2.8		1.8	3.6	<b>10.41</b>
#33	10.4	3.6		1.8	3.7	<b>9.04</b>
#34	10.2	2.7				<b>7.50</b>
#35	11.5	3.7	1.80			<b>10.68</b>
#36	8.4	3	1.4	1.4	3	<b>9.42</b>
#37	11.6	2.8	1.80	1.8		<b>12.89</b>
#38	10.4	2.6	1.80	1.8	3.7	<b>12.92</b>
#39	11.6	3.6		1.8	3.8	<b>10.27</b>
#41	11.5	2.8				<b>8.70</b>
#42	10.2	2.8		1.80	3.7	<b>9.64</b>

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine v. Variant Inc.*, 3 U.S.P.Q.2d 1766 (Fed. Cir. 1987). Because Schetky fails to teach or suggest a titanium alloy composition having pseudo-elastic properties comprising about 8 to about 10 wt% molybdenum, having a Mo<sub>eq</sub> weight about 7 to about 11 wt%, wherein the titanium alloy composition does not comprise chromium, Schetky cannot anticipate the present invention. Applicants respectfully request a withdrawal of the anticipation rejection under 35 U.S.C. § 102(b) and allowance of the claims.

With respect to the § 103 rejection, the Examiner has stated that “Schetky teaches examples of a superelastic and pseudoelastic Ti alloy with a Moeq amount that falls within the instant range.” (Office Action dated March 8, 2006 at page 7)

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness, i.e., that all elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970);

*Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

As described above, Schetky fails to teach or suggest all elements of the claims as presently amended. Because Schetky fails to teach or suggest a titanium alloy composition having pseudo-elastic properties comprising about 8 to about 10 wt% molybdenum, having a Mo<sub>eq</sub> weight about 7 to about 11 wt%, wherein the titanium alloy composition does not comprise chromium, Schetky cannot render obvious the present claims.

In addition, Applicants respectfully submit that Schetky teaches away from the claimed compositions and therefore there is no motivation to modify Schetky. Further, one of ordinary skill in the art would not have a reasonable expectation of success that a modification of Schetky would provide an alloy with pseudo-elastic properties. For example, Table III of Schetky teaches away from compositions having a molybdenum content of less than 10 wt%. Table III discloses alloys #27 and #36 comprising 9.5 wt% and 8.4 wt% Mo, respectively, but these alloys failed to display either pseudo-elastic strain recovery or shape memory strain recovery. (Col. 7, ll. 50-52).

Although alloy # 28, comprising 10.0 wt% Mo, did display pseudo-elastic strain recovery, its pseudo-elastic strain recovery properties were reduced compared to alloy # 42, comprising 10.2 wt% Mo, which exhibited the highest pseudo-elastic strain recovery of the fifteen alloys screened. (Col. 7, ll. 13-15). A person of ordinary skill in the art would interpret this disclosure to suggest that a titanium alloy within the disclosed composition range having less than 10.0 wt% Mo would fail to exhibit significant pseudo-elastic strain recovery. In addition, Table III of Schetky discloses that of the alloys with less than or equal to 10 wt% Mo (alloys #27, 28, 29, and 36), the only alloy that exhibits pseudo-elastic strain recovery (alloy #28) also contains the highest amount of Cr (1.7 wt%). Therefore one of ordinary skill in the art would expect that a high amount of Cr is required to provide an alloy with pseudo-elastic strain recovery for alloys that comprise less than or equal to 10 wt% Mo. Applicants respectfully submit that there is no motivation to modify Schetky to provide titanium alloys comprising about 8 to about 10 wt% Mo because those alloys exhibited decreased pseudo-elastic strain recovery. There is also no motivation to further provide titanium alloys comprising about 8 to about 10 wt% Mo devoid of Cr because Schetky expressly discloses that for that class of alloys, only the alloy containing the highest amount of Cr exhibited pseudo-elastic strain recovery. Because Schetky fails to teach or suggest all elements of the present claims and there is no motivation to modify Schetky with a

reasonable expectation of success, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. Reconsideration and withdrawal of this rejection are respectfully requested.

Even if a *prima facie* case of obviousness were conceded, which it is not, it is respectfully submitted that applicant's invention is not obvious because the particular combination of claimed elements results in unexpectedly beneficial properties. An applicant can rebut a *prima facie* case of obviousness by presenting comparative test data showing that the claimed invention possesses unexpectedly improved properties or properties that the prior art does not have. *In re Dillon*, 919 F.2d 688, 692-93, 16 U.S.P.Q.2d 1987, 1901 (Fed. Cir. 1990).

The Examiner has acknowledged that Schetky teaches that the elastic spring back for alloys with lower Mo is expected to be less than the elastic spring back for alloys with higher Mo, but stated that "it is unclear how/if Applicant's alloy exhibits unexpected results with respect to the lower Mo alloys taught by the prior art." (Office Action dated March 8, 2006 at page 10)

Table III of Schetky discloses that of the alloys with less than or equal to 10 wt% Mo (alloys #27, 28, 29, and 36), the only alloy that exhibits pseudo-elastic strain recovery (alloy #28) also contains the highest amount of Cr (1.7 wt%). Therefore, one of ordinary skill in the art would expect that a high amount of Cr is required to provide an alloy with pseudo-elastic strain recovery for alloys that comprise less than or equal to 10 wt% Mo. It is therefore unexpected that a titanium alloy composition comprising about 8 to about 10 wt% molybdenum, having a  $Mo_{eq}$  weight of about 7 to about 11 wt%, wherein the titanium alloy composition is devoid of chromium, would nonetheless exhibit having pseudo-elastic properties. Samples 2-5 from Table 1 of the present Application is reproduced in the Table below along with a calculation of  $Mo_{eq}$  weight based on equation (1).

Sample	Mo	Al	Cr	V	Nb	MoEq
2	8.03	3.09		2.03	3.89	<b>7.39</b>
3	8.4	3.03		1.94	3.83	<b>7.74</b>
4	8.97	3.03		1.95	3.86	<b>8.33</b>
5	9.34	3.01		1.95	3.79	<b>8.70</b>

Samples 2-5 have about 8 to about 10 wt% Mo, a  $Mo_{eq}$  weight of about 7 to about 11

wt%, and are devoid of chromium. All exhibit an elastic strain recovery of approximately 60% to approximately 80% of an applied 4% deformation strain. (Figure 1; ¶ [0054]). It is completely unexpected that the alloys comprising low Mo content and lacking Cr would exhibit pseudo-elastic strain recovery. Applicants respectfully submit that the unexpected results would successfully rebut a *prima facie* case of obviousness if it existed. Reconsideration and withdrawal of the obviousness rejection are respectfully requested.

Claim Rejections over JP 56000241A or US 4,253,873 to Sagoi et al.

Claims 1-3, 9-16, and 24 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by or in the alternative, under 35 U.S.C. § 103(a), as obvious over JP 56000241A (“JP ‘241”) or US 4,253,873 to Sagoi et al. (“Sagoi”). Applicants respectfully traverse this rejection.

The Examiner has stated that “JP ‘241 teaches examples of a titanium alloy within the instant  $Mo_{eq}$  range of instant Claim 1 (JP ‘241 at Table I): alloy A ( $Mo_{eq}=8.82$ ), D ( $Mo_{eq}=10$ ) [Applicants have calculated D to have  $Mo_{eq}=6.8$ ], E ( $Mo_{eq}=10.32$ ), I ( $Mo_{eq}=9.68$ ), N ( $Mo_{eq}=9.72$ ).” (Office Action dated March 8, 2006 at page 4) The Examiner has also stated that JP ‘241 or Sagoi teach a titanium alloy composition, within the presently claimed  $Mo_{eq}$  range, comprising 2.0-5.0 wt% of Al, 1.0-9.0 wt% of Mo, 6.1-9.0 wt% of Cr, balance Ti. (Office Action dated March 8, 2006 at pp. 4-5) The Examiner has further stated that “if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims (such as superelastic or pseudoelastic behavior) [are] necessarily present.” (Office Action dated March 8, 2006 at page 5)

Applicants respectfully submit that both JP ‘241 and Sagoi fail to teach or suggest a titanium alloy that is devoid of chromium as required by Claim 1. Both disclose a titanium alloy comprising, *inter alia*, 6.1 to 9 wt% chromium. (Abstract) As shown in the Table below, all the alloys disclosed in the Examples of JP ‘241 and Sagoi comprise chromium. In addition, both JP ‘241 and Sagoi fail to teach a Ti alloy comprising about 8 to about 10% molybdenum, which also has a  $Mo_{eq}$  weight of about 7 to about 11 wt%.

<b>JP '241</b>	<b>Mo</b>	<b>Al</b>	<b>Cr</b>	<b>V</b>	<b>Nb</b>	<b>MoEq</b>
A	1.1	2.2	6.20			<b>8.82</b>
B	1.1	2.2	8.80			<b>12.98</b>
C	8.9	2.1	8.80			<b>20.88</b>
D	1.2	4.8	6.50			<b>6.80</b>
E	1.1	4.7	8.70			<b>10.32</b>
F	8.7	4.9	6.30			<b>13.88</b>
G	8.7	4.8	8.80			<b>17.98</b>
H	4.3	2.3	7.60			<b>14.16</b>
I	4.1	4.5	6.30			<b>9.68</b>
J	4.5	2.2	8.10			<b>15.26</b>
K	8.7	2.2	8.80			<b>20.58</b>
L	8.8	2.1	8.90			<b>20.94</b>
M	9.8	2.6	3.20			<b>12.32</b>
N	6.3	4.1	4.70			<b>9.72</b>
<b>Sagoi</b>	<b>Mo</b>	<b>Al</b>	<b>Cr</b>	<b>V</b>	<b>Nb</b>	<b>MoEq</b>
1	1.1	2.1	6.30			<b>9.08</b>
2	1.1	2.2	8.70			<b>12.82</b>
3	8.8	2.1	6.20			<b>16.62</b>
4	8.6	2.3	8.90			<b>20.54</b>
5	1.3	4.8	6.10			<b>6.26</b>
6	1.2	4.7	8.60			<b>10.26</b>
7	8.9	4.7	6.50			<b>14.60</b>
8	8.6	5	8.90			<b>17.84</b>
9	4.2	2.3	7.40			<b>13.74</b>
10	3.8	4.2	6.60			<b>10.16</b>
11	1	3.5	6.50			<b>7.90</b>
12	1.2	2.2	6.10			<b>8.76</b>
13	1.1	2.2	8.70			<b>12.82</b>
14	8.8	2.2	8.70			<b>20.52</b>
15	1.2	4.7	6.30			<b>6.58</b>
16	1.2	4.7	8.60			<b>10.26</b>
17	8.9	4.8	6.20			<b>14.02</b>
18	8.8	4.9	8.70			<b>17.82</b>
19	4.2	2.3	7.40			<b>13.74</b>
20	4.1	4.3	6.50			<b>10.20</b>
21	8.8	2.1	8.70			<b>20.62</b>
22	1.1	2.2	6.20			<b>8.82</b>
23	1.1	2.2	8.80			<b>12.98</b>
24	8.9	2.1	8.80			<b>20.88</b>
25	1.2	4.8	6.50			<b>6.80</b>
26	1.1	4.7	8.70			<b>10.32</b>
27	8.7	4.9	6.30			<b>13.88</b>
28	8.7	4.8	8.80			<b>17.98</b>
29	4.3	4.5	7.60			<b>11.96</b>

30	4.1	4.5	6.30			<b>9.68</b>
31	4.5	2.2	8.10			<b>15.26</b>
32	1.3	4.5	6.50			<b>7.20</b>

Applicants respectfully submit that both JP '241 or Sagoi fail to disclose all elements of the claims as presently amended. Accordingly, neither JP '241 nor Sagoi cannot anticipate nor render obvious the present claims. Reconsideration and withdrawal of this rejection are respectfully requested.

Applicants respectfully submit that the presently claimed alloy and the prior art composition do not share identical chemical structures and therefore do not necessarily share the same properties. The Examiner admits that JP '241 or Sagoi do not teach a titanium alloy composition that is superelastic or pseudoelastic. (Office Action dated March 8, 2006 at page 5)

In contrast, JP '241 and Sagoi are directed to titanium alloy compositions having high mechanical strength, which are suitable for turbine blades. (Sagoi Abstract; JP '241 Abstract) Applicants submit that the high mechanical strength titanium alloy compositions of JP '241 and Sagoi used in, for example, turbine blades are materially different from the presently claimed superelastic and/or pseudoelastic titanium alloy compositions which can be used in, for example, eyewear frames and orthodontic appliances. For at least these reasons, neither JP '241 nor Sagoi teach or suggest all of the claimed elements and therefore cannot anticipate nor render obvious the present claims. Applicants respectfully request a withdrawal of the rejection under 35 U.S.C. § 102(b)/§ 103(a) and allowance of the claims.

Reconsideration and withdrawal of this rejection are respectfully requested.

#### Nonstatutory Double Patenting Rejections

Claims 1-25 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending Application No. 10/609,004, 10/869,359, 10/609,003, and 10/755,085.

Applicants thank the Examiner for pointing out the potential obviousness-type double patenting issue between the claims of the present application and those of the co-pending applications. In view of the possibility that claims in the cited application or the present



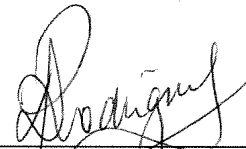
application will be further amended before allowance, Applicants will defer responding to this provisional rejection until claims in the reference applications are allowed, claims in the present application are otherwise allowable, and it is determined whether this provisional rejection becomes an actual rejection.

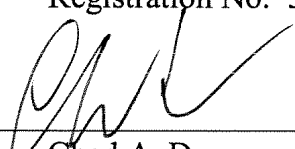
It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the objection(s) and rejection(s) and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

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